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# BULLETIN
OF
THE PENNSYLVANIA MUSEUM

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## THE LAMBORN COLLECTION OF ROMAN GLASS FRAGMENTS

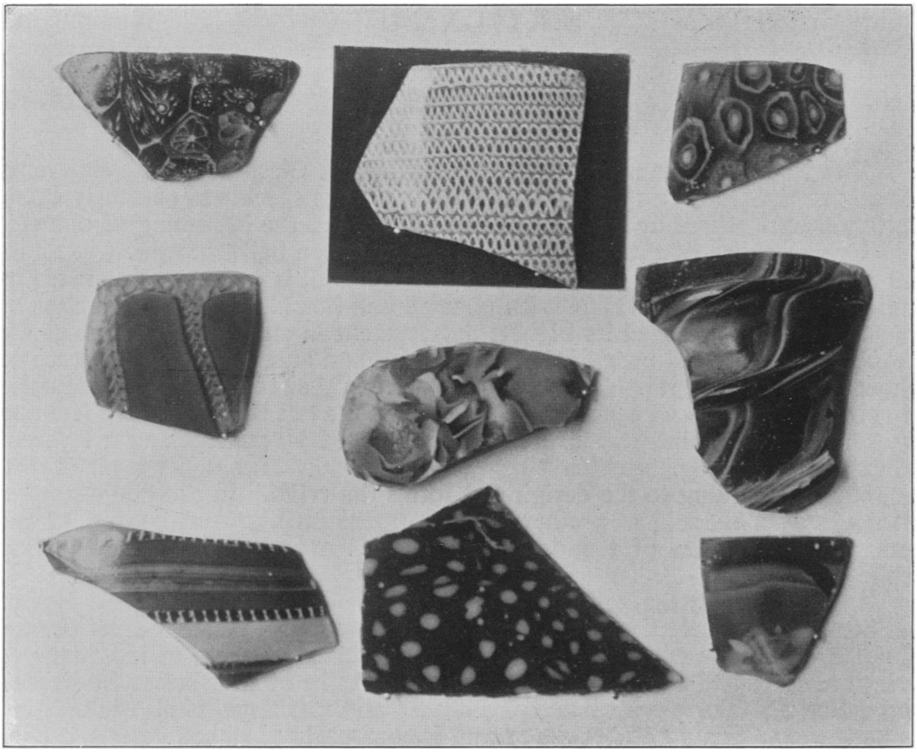
The Robert H. Lamborn Collection of Roman Glass in the Pennsylvania Museum numbers over 1500 fragments and includes specimens of nearly every variety manufactured by the Roman glass-makers at the beginning of our era.

One specimen of the cameo ware, representing a bull's head between garlands of flowers cut in white on a black background, is especially deserving of notice. (See illustration.) It is but a small and humble example of a class of manufacture that reached its highest development in such works of art as the Barberini or Portland vase of the British Museum and the Borbonico vase of Naples; but, as such, it holds an important place in the series. Perfect examples are extremely rare, and even fragments such as the one mentioned are few and by no means insignificant. The effect is produced by superposing a layer of white paste over another either blue, purple or black. The upper layer is then carved out according to the design and forms the relief. In the fine examples cited above, a shading is produced by the more or less deep cutting of the cameo, which allows of the dark underground appearing through the thin white paste.

In other styles the collection is very full. Besides the opaque glass of various shades—turquoise, lapis-lazuli, jasper, porphyry, malachite, serpentine, obsidian, yellow or white stone—there are variations of these in imitations of veined marbles and conglomerate stones. A full line of translucent fragments, simulating agate or onyx of different shades and markings, is also interesting in its variety. Some of these fragments formed parts of ribbed vessels, a style obtained by adding partly melted strings of glass to the surface, or by molding at a certain period of the "paraison."

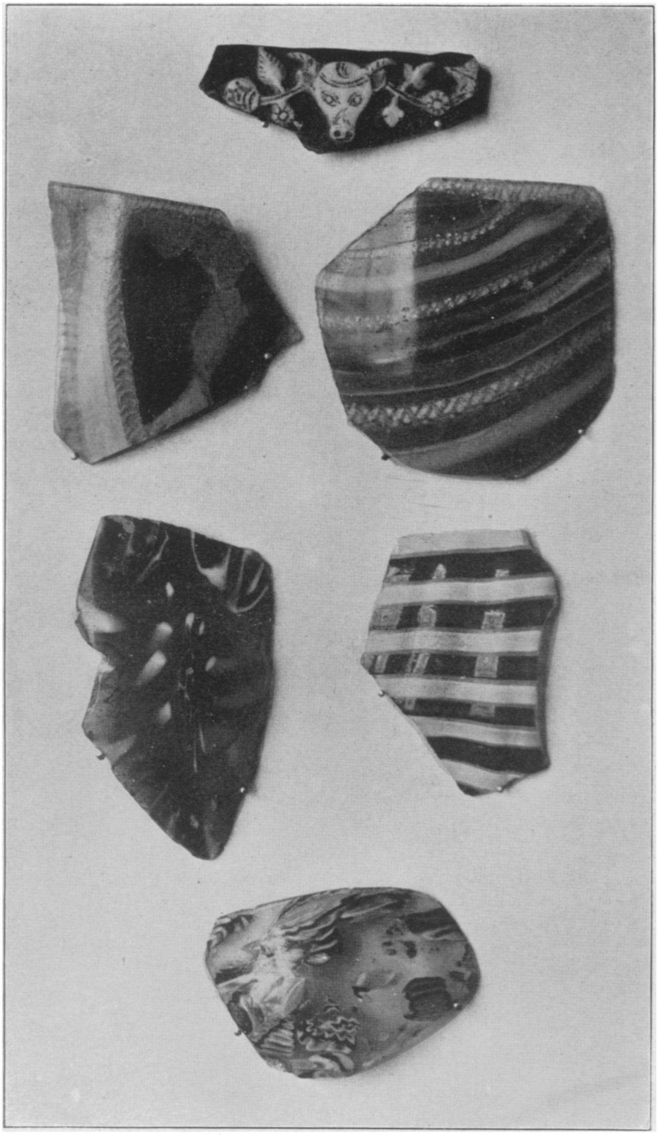
One of the most beautiful products represented in the series is the amethystine, of a rich, pure, soft-skinned, crystalline purple. One specimen is sparsely veined with white opaque streaks; another remarkable piece is opalescent as well as veined, and when held up to the light becomes fiery red, recalling Pliny's description of the enigmatic "Murrhine" (N. H. Book XXXVII, 8).

Then comes an almost infinite variety of mosaic glass, from the exquisite translucent green, through which loosely rolled opaque white rods are disposed in slanting rows with charming effect, approaching the madrepore coralline limestone, to the variety later imitated under the name of "millefiori" by the Venetians, in which polychrome flower patterns are joined together in a mass resembling mosaic. This result was arrived at by taking rods of a given floral outline, joining them together and heating them to a plastic condition. They were then drawn out, and the size was thus reduced according to taste. When cold, transverse sections were cut, on each of which the design appeared. In this process we have a development of the fused mosaic glass which the Egyptians used for inlays and slabs. Only here it is adapted to ordinary uses. Bowls and such vessels were perhaps partly blown, but finished on the wheel and highly polished.



ANCIENT ROMAN GLASS

Thin ribbons of glass of various gaudy hues were also joined together at right angles, with tartan-like effect, gold leaf being sometimes set in between two layers of thin clear glass to enhance the richness of the color scheme. There are several varieties of the double-layer process. One fragment, for



ANCIENT ROMAN GLASS
Fragment at Top is Cameo Cut Glass
White Relief on Black Ground

instance, presents an outer layer of very thin deep blue glass less than the thirty-second part of an inch thick. The surface is pressed in at regular intervals, forming indentations so that when held up to the light these thinner depressions form light-spots. This thin upper layer is veined on its outer surface with white wavy lines stretching diagonally about a quarter of an inch apart, and on the inner surface with dark blue and white close zigzag lines which are seen through the thicker under layer of clear white glass. When held up to the light all these lines appear through the fragment.

Many varieties of filigree glass, the "vitro di trina" of the Venetians, of fine or coarser thread, are in the collection. Besides the pure white or golden yellow, lacy varieties, edged with a narrow blue, red or green border, these filigree rods of white or yellow opaque twisted threads are much used in strips or as borders, or even between the plaid-like colored bands of ribbon glass, forming endless combinations. A good effect is also produced with the aid of a silvery metallic interlining between the layers of clear white filigree.

The translucent sapphire glass of varied shades, designs and processes of manufacture, affords another evidence of the enormous variety of coloring and combinations at the disposal of the Roman artist when at the zenith of his art, and strips of inlay, rondelles, buttons, etc., attest the diffusion of glass as a material used in decoration.

There are in the collection some pieces of thin clear glass engraved or ground on the wheel in shallow designs. These, however, are by no means as successful in effect. It would seem that accidents were common in the course of their manufacture, and Martial (XIV, 115) says that jurists were called upon to define the circumstances under which the workman was liable for the value of the vessel destroyed in the process.

Etching upon glass, it is needless to say, was unknown, as it depends upon the properties of fluoric acid, a chemical discovery of the last century (Smith's Græco-Roman Antiquities, II, 973).

Through a process entirely different from those mentioned above, excellent artistic effects were produced. The glass surface was here cut into and the softer glass paste was poured in, forming polychrome flowers and other designs.

Froehner, in his Catalogue of the Charvet Collection, divides Roman glass into fifteen classes; but in going over the multiplicity of the results obtained and the endless combinations of processes through which these results have been produced, it would seem as though such a classification was more or less arbitrary.

The enormous quantity of glass found in the ruins of Pompeii shows that in the first century the industry was highly flourishing in southern Italy. Nevertheless, it is well known that at the beginning of our era the Romans imported glass from Alexandria, then one of the great centres of manufacture and trade. Hadrian, in a letter to the Consul Servianus, mentions glass-blowing as one of Alexandria's chief industries. Cicero (pro. Rab. Post., 14-40) tells of glass, linen and paper as brought from Egypt, and an ordinance of Aurelian including it in the tribute to Rome, informs us that this Egyptian product was still an important article of trade in the latter part of the third century.

But if the Romans learned the art from Egypt, they were wonderfully apt pupils and became past masters. There is hardly an application of it in mediæval Europe that they did not deal with. Strabo (XVI, 25) says that in Rome new processes were invented daily for simplifying the manufacture of the product or for improving upon the coloring. Such was the development of the industry that "a successful imitation of crystal may now be made so cheaply that a drinking glass with its stand may be sold for a copper coin."

It would also appear that in his day the Britons obtained what little glass they used from the Continent, and Edward Dillon, in his interesting work on "Glass," expresses his belief that as early as the second century of our era there were glass works in southern England where cinerary urns were manufactured. These have been found in considerable numbers. They were enclosed in lead or stone coffins which preserved them.

The glass industry among the Romans grew to such magnitude that eventually glass was manufactured wherever they penetrated. Traces of such enterprise are found in Gaul, Spain, England and the Rhenish provinces (Pliny, H. N. XXXVI, 192-199, comp. Guicherat, Rev. Arch., XXVIII). In the first century, according to Pliny, under Tiberius, glass-blowing became of importance, and in time grew to be essentially a Roman art. This it remained for four hundred years. A prodigious number of fragments as fine as the most celebrated pieces that have come down to us are dug up every year in Rome.

We know from Pliny that the Roman glass-makers made opaque red, black, white, jacinth, sapphire and other gem imitations, as well as "Murrhine" glass. He names enormous sums as having been paid for the best grades of the artistic products that were valued above silver and gold.

When and where blown glass was evolved is doubtful. Glass manufactured in the Ptolemaic period still belongs to the old type. The new process, however, seems to have been in common use during the Roman or Coptic period in Egypt, and Roman tradition gave credit for the new mode of manufacture to the Sidon glass-makers. How early true blown glass was made in Egypt it is impossible to state. Ancient Egyptian glass vases are molded. A representation in a tomb of the time of the pyramid-builders, formerly regarded as a glass-blowing scene, was undoubtedly meant for a metallurgical operation, and although glass vases are represented on the walls of a tomb at Beni-Hassan as early as the XIIth dynasty (*circa* 2000 B. C.), the wall painting in which bulbs are seen at the end of blow pipes held by men who have just removed them from the fire has been shown by Mr. Griffith to belong to the same category (see Beni-Hassan, part IV, pl. XX, p. 5). Another painting of the New Empire (Wilkinson, II, 140), which shows two men blowing through tubes at a large vase, while a third holds a bubble at the end of his blow pipe, as Erman has already remarked (Ægypten und Æg. Leben, II, 608-9), is difficult to account for in any other way but that the scene deals with some part of the glazing process. But no blown glass so far has been found in Egypt prior to Roman times.

In arguing about Egyptian questions, one must never feel too sure, because certain things have not been found, that they were not known. When Erman wrote his chapters on Egyptian industries, in 1894, he ascribed the use of faience or porcelain glaze, such as beads and other small glass objects, to the close of the Old Empire. He also mentioned, as the earliest specimen known, a vase of faience of the reign of Usertesen (*circa* 2000 B. C.). Some six years later, however, at Abydos, a full line of that ware, including figurines and an admirable fragment of a glazed vase bearing Mena's name, was discovered by Mr. Flinders-Petrie. Other specimens were also found by Mr. Amélineau, all dating from the reign of the founder of the Egyptian empire. Indeed, the quality and abundance of this material make it certain that the industry went back to prehistoric times. It has been suggested by a French scholar that the possibilities of glass-making were discovered in the copper age through the metallurgical operations connected with the copper industry. The early glazes were colored with oxide of copper, and the suggestion is a plausible one.

However this may be, chemically the Egyptian glaze is of the same composition as glass. An analysis of Roman glass given by Dillon shows: Silicate, 71.5; soda, 16.5; lime, 8; iron oxide, 1; alumina, 2. And these, with the coloring matter, are the normal elements of ancient glass-making virtually at all times.

In 1898 Mr. Loret discovered in the tomb of Amenhotep II, in the Valley of the Kings, some superb glass vases, to which others were subsequently added by the discovery of the tomb of Amenhotep III (*circa* 1450 B. C.). The series, now in the Cairo Museum, is unique. Several of these vases are decorated with a dark blue royal cartouche inlaid in polychrome signs. The highest measures eight inches. One is ornamented with three rosettes in relief, the twelve petals of which are blue, red and green on a white background. The most remarkable of the series is one decorated with horses and negroes, which are inlaid beneath the outer surface and appear through its diaphanous transparency.

The earliest dated piece of glass remains, however, a fragment of dark blue impressed with the name of Autef III, of the XIth dynasty, mentioned by Wilkinson (Birch edition, II, p. 142), and the earliest preserved glass vase in existence is still the blue vase in the British Museum bearing the name of Thothmes III.

It is probably in an attempt to imitate veined stone vessels so commonly used in Egypt that the Egyptians and the Mediterranean peoples first devised the small "Chevron" glass bottles that were in such favor throughout the Mediterranean area for at least one thousand years. The "Chevron" pattern with which they were decorated, as may be seen on specimens in the collection of the Pennsylvania Museum, was produced by winding threads of colored glass around the vase while hot, and incorporating them by rolling. The wavy design was then formed by dragging the surface threads in opposite directions. The polychrome threads thus applied of course do not penetrate through the thickness of the body of the vase. It is noteworthy that the few vessels of this type that can be assigned to the XVIIIth dynasty are said by authorities, who have handled numerous examples, to be unsurpassed by later specimens for "brilliancy of color and purity of glaze." The interior is rough and appears to have been modeled upon a core of sand, although this is less perceptible in the Egyptian than in other specimens.

These bottles were highly valued. Mr. Salomon Reinach (quoting Tolstoi and Kondakof, *Antiquités de la Russie Méridionale,* 1891) mentions some of them found in the Crimean tombs, where they were found attached with a gold chain to the wrist of the dead. In Rhodes they are found associated with objects of the third and fourth centuries B. C., and they do not appear later than the Christian era.

In Etruscan burials there are found small cups of translucent green glass sprinkled over with yellow stars. Mixed in with these are splashes of gold, or of color, or of filigree glass. Mr. Dillon sees in this an older style than the madrepore glass so commonly found in Rome. Another variety also, met with in the Etruscan tombs, is the opaque blue with much gold leaf mixed and twisted together. Both of these varieties he regards as probable importations, although they are classed with the Roman manufactures.

None of the small glass bottles or amphoræ found in Greek or Etruscan interments; and imported from the Ægæan Islands, can possibly be assigned as early a date as the XVIIIth Egyptian dynasty, and so far the Egyptian series claims priority.

A large number of fragments of these small "Chevron" bottles was found in the ruins of Akhenaten's capital at Tel-el-Amarna (B. C. 1400). Whether or not these were of Egyptian manufacture has been doubted, and the discoverer himself, Mr. Flinders-Petrie, calls them in his report "Ægæan Glass." What, however, can admit of no doubt, is that so far they are the earliest dated specimens known of that ware, and that there was a glass factory at Tel-el-Amarna, all the details and processes of which are illustrated by actual products in every stage of manufacture. Lumps of glass, frit of various colors, glass rods or strips, coloring matter, quartz pebbles used as silicate, beads, amulets, decorative ornaments of every description, with the very molds in which they were cast, have been recovered along with parts of the clay furnace in which the glass was fused. A full series from this ancient factory was obtained by the writer, at the time of the discovery, through the kindness of Mr. Flinders-Petrie, for the Free Museum of Science and Art in Philadelphia. It is the most instructive series in this country for the study of the manufacture of glass in the fifteenth century B. C.

Ancient glass was essentially a soda glass. The silicate used by the Egyptians was quartz, and the alkali was supplied from the salt lakes of the Delta in the form of ashes from marine plants or of natron, an impure carbonate of soda. While the Romans, like the Egyptians, used oxide of copper for coloring their glass, their deep diaphanous sapphire blue was probably obtained from cobalt.

Slabs of glass of great size were made for wall decoration in good imitation of the red Egyptian porphyry with white spots, or of the green serpentine from Taygetus with large white crystals of felspar. Such slabs were used especially for bathrooms. They were joined together in designs, the "opus sectile" of Roman authors, and are a sort of protomosaic product.

For red coloring, as well as blues and greens, oxide of copper was used. The ancients never reached the beautiful ruby red of the mediæval artists, which was obtained from oxide of iron or gold. Purple was obtained from manganese oxide, and is found on Egyptian glazes of the Ist dynasty. It was, however, seldom used to color early glass. The suggestion has been made that perhaps the Egyptians found it difficult to reheat the frit without bringing about loss of color, owing to the strong oxidizing influence of the repeated exposure. Yellow was derived from ochre mixed with oxide of antimony, a substance known to the Egyptians from very early times and imported by the Semitic traders. The jacinth or honey red color was produced from oxide of iron.

While the Greeks never gave much heed to the glass industry—they had no special name for it and called it "fused stone"—and while they imported the products of Rhodes, Cyprus or Italy, glass was in use for decorative purposes in the Mycenean period. The frieze of the Men's Hall at Tiryns was studded with blue glass. Under analysis, Dr. Virchow found these studs to be soda glass colored with a copper oxide. Cobalt, however, is said to have been found in beads from Mycenæ and from Attic tombs, and Helbig (Homerisches Epos, p. 80) suggests that this deep blue vitreous cobalt glass may represent the "Kyanos" of Homer. S. Y. S.

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## SOME RARE EASTERN CARPETS

Out of the J. Lees Williams Collection of Oriental Carpets, now on exhibition in the Museum, we have selected three examples to be used as illustrations in this issue of the Bulletin, and append a short description of each carpet. Much interest has been manifested in the exhibition of this collection. As an instance of this it may be remarked that a professor in the University of Wisconsin recently informed the Director of the Museum that, out of five days at his disposal for Philadelphia sightseeing, three of these days were devoted by the professor and his wife to the study of Eastern carpets exhibited in the Museum.

In the future it is intended that a catalogue of these rare carpets shall be made, in which the history of the art of weaving knotted works in the East will be examined at length and, in a measure, comprehensively. In the meantime we content ourselves in this issue of the Bulletin with a brief description of the three examples shown in the illustrations which follow.

The first illustration is that of a Prayer Carpet. It is Turkish, and tradition insists that prayer carpets of this design, color effect and texture could come only from the looms of Ghiordes. However this may be, it is certain that in this example we have before us one of the finest of that group of rare prayer carpets which has so long borne the name of Ghiordes that its right to this name will not be here questioned. There are several types of Turkish prayer carpets, all of them of more or less historic interest and artistic merit, but the right of the Ghiordes carpet to primacy in the group will hardly be disputed. A few prayer carpets belong to the fifteenth century (see No. 614 of the J. Lees Williams Collection now on exhibition in the Museum). Most of these carpets, however, are not earlier than the middle of the seventeenth century, to which period is assigned the example here illustrated. In some subtle way the weaver has imparted to the fabric a dignity and seriousness in keeping with the